CLAIMS

What is claimed is:

1. An electrically conductive, polyimide based substrate comprising:

a polymeric blend of at least a polyimide component and a polyaniline component, the polyaniline component being:

a. present in a range between and including any two of the following: 5, 10, 15, 20, 25, 30, 25, 30, 35, and 40 weight percent of the total substrate, and

b. derived from a liquid dispersion of doped or un-doped polyaniline particles having an average particle size in a range between and including any two of the following: 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 2.0, 3.0, 4.0, and up to (but not including) 5 microns, to provide at least one substrate surface having:

i. a surface electrical resistivity in a range between and including any two of the following: 10,000, 10^5, 10^6, 10^7, 10^8, 10^9, 10^{10}, 10^{11}, 10^{12}, 10^{13}, and 10^{14} ohms per square,

ii. a surface gloss factor in a range between and including any two of the following: 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, and 120, and

iii. a surface roughness, Ra factor (microns), between and including any two of the following: 0.05, 0.06, 0.07, 0.08, 0.09, 0.10, 0.11, 0.12, 0.13, 0.14 and 0.15.

2. A substrate in accordance with Claim 1, wherein the thickness of the substrate is in a range between and including any two of the following: 5, 8, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, and 125 microns.

3. A substrate in accordance with Claim 1, wherein the substrate is created in part by forming a doped polyaniline dispersion and subjecting the dispersion to a shearing force over a sufficient time to reduce the doped polyaniline particles to an average size of between and including any two of the following numbers 4.9, 4.5, 4.0, 3.5, 3.0, 2.5, 2.0, 1.5, 1.0, and 0.5 microns and then mixing the doped polyaniline dispersion with a polyimide precursor solution.

4. A substrate in accordance with Claim 1, wherein at least a portion of the substrate is also laminated to a metal.

5. A substrate in accordance with Claim 1, wherein the polyimide component is derived from a polyamic acid precursor created at least in part by contacting one or more dianhydride components with one or more diamine components, the dianhydride component being selected from a group consisting of: pyromellitic dianhydride, 4,4'-oxydiphthalic anhydride, bis(3,4-dicarboxyphenyl) sulfone dianhydride, 2,2-bis(3,4-dicarboxyphenyl) 1,1,1,3,3,3,-hexafluoropropane dianhydride (6FDA), 2,2'-bis[4-(3,4-dicarboxyphenoxy)phenyl]propane dianhydride, 3,3',4,4'-benzophenonetetracarboxylic dianhydride, 3,3',4,4'-biphenyltetracarboxylic dianhydride and combinations thereof.

6. A substrate in accordance with Claim 1, wherein the polyimide component is derived from a polyamic acid precursor created at least in part by contacting one or more dianhydride components with one or more diamine components, the diamine component being selected from a group consisting of: 1,4-diaminobenzene (PPD), 1,3-diaminobenzene (MPD), 4,4'-diaminodiphenyl ether (4,4'-ODA), 3,4'-diaminodiphenyl ether (3,4'-ODA), 1,3-bis-(4-aminophenoxy) benzene (APB-134 or RODA), 1,3-bis-(3-aminophenoxy) benzene (APB-133), 2,2-bis-[4-(4-aminophenoxy)phenyl] propane (BAPP), bis-(4-(4-aminophenoxy)phenyl sulfone (BAPS), 4,4'-bis(3-aminophenoxy)diphenylsulfone (m-BAPS), 4,4'-bis-(aminophenoxy)biphenyl (BAPB), bis(4-[4-aminophenoxy]phenyl) ether (BAPE),), 1,6-hexamethylenediamine (HMD), 2,2'-bis-(4-aminophenyl) 1,1,1,3,3-hexafluoro propane (6F diamine), and combinations thereof.

7. A substrate in accordance with Claim 1, wherein the polyaniline component is selected from the group consisting of Emeraldine base polyaniline, Emeraldine salt polyaniline, leucoEmeraldine polyaniline, nigraniline polyaniline, and pernigraniline polyaniline.

8. A substrate in accordance with Claim 1, wherein the polyaniline component is derived from an aniline component selected from the group consisting of aniline, alkylaniline and alkoxyaniline.

9. A substrate in accordance with Claim 1, wherein the polyaniline component is dispersed in a polar solvent selected from a group consisting of: dimethylacetamide (DMAc), N-methylpyrrolidinone (NMP), gamma-butyrolactone, N,N'-dimethyl-formamide (DMF), dimethyl sulfoxide (DMSO), tetramethyl urea (TMU), N,N-dialkylcarboxylamides, N,N-diethylformamide, N,N-diethylacetamide, dimethylsulfoxide, N-cyclohexyl-

2-pyrrolidone, dimethylsulfone, hexamethylphosphoramide, tetramethylenesulfone, diglyme, and pyridine.

10. A substrate in accordance with Claim 9, wherein the polyaniline component is dispersed in a mixture of a first solvent and a second solvent, wherein the first solvent has a surface tension between 34 mN/m and 42 mN/m, and wherein the second solvent has a surface tension either between and including 20 and 33.5 mN/m or between and including 42 and 500 mN/m.

11. A substrate in accordance with Claim 9, wherein the polyaniline component is dispersed in a mixture of a first solvent and a second solvent wherein the second solvent is selected from the group consisting of water, alcohols, ethers, and ketones.

12. A substrate in accordance with Claim 1, wherein the polyaniline component is doped with a protic acid having an acid dissociation constant (pKa) equal to or less than 4.8.

13. A substrate in accordance with Claim 1, wherein the polyaniline component is doped with an acid selected from a group consisting of hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, hypophosphoric, phosphonic acids, hydrofluoroboric acid, hydrofluorophosphoric acid, hydrochloric acid, aliphatic acids, aromatic acids, alicyclic acids, and polybasic acids.

14. A substrate in accordance with Claim 1, said substrate comprising all or part of an imaging transfer belt in a high-speed color copying machine.

15. A substrate in accordance with Claim 1, said substrate being a component of a multilayer flexible or rigid circuit board.

16. A substrate in accordance with Claim 1, said substrate being a component of an anti-static blanket.

17. A substrate in accordance with Claim 1, said substrate being a component of a circuit package.

18. A single layer substrate in accordance with Claim 1, further comprising a filler.

19. A single layer substrate in accordance with Claim 1, further comprising a filler selected from the group consisting of metal, metal oxides, carbon fibers, graphite, and semi-conductor powders.

20. A substrate in accordance with Claim 1, wherein the substrate is a component of a packaging composition, the packaging composition being a chip on lead ("COL") package, a chip on flex ("COF") package, a

lead on chip ("LOC") package, a multi-chip module ("MCM") package, optoelectronic package, flat-wire applications, a ball grid array ("BGA" or "μ-BGA") package, chip scale package ("CSP") or a tape automated bonding ("TAB") package.

21. A substrate in accordance with Claim 1, wherein the substrate is a component of a integrated circuit packaging substrate comprising a conductive passageway, said passageway comprising one or more members of the following group: a wire bond, a conductive metal, and a solder bump.

22. A substrate in accordance with Claim 1, wherein the substrate is a self-adherable film using heat, pressure or a combination thereof.

23. A substrate in accordance with Claim 1, wherein the substrate is a self-adherable film and wherein the film is used as an image transfer belt in a color copying machine.

24. A multilayer film comprising an inner layer and two outer layers, wherein the outer layers are adjacent to the inner layer, wherein at least 50, 60, 70, 80, 85, 90, 95, 98 or 100 weight percent of the outer layers are derived from a thermoplastic polyimide component and a doped polyaniline component, and wherein at least 50, 60, 70, 80, 85, 90, 95, 98 or 100 weight percent of the inner layer is derived from a non-thermoplastic polyimide.

25. A multilayer film comprising an inner layer and two outer layers, wherein the outer layers are adjacent to the inner layer, wherein at least 50, 60, 70, 80, 85, 90, 95, 98 or 100 weight percent of the outer layers are derived from a thermoplastic polyimide component and a doped polyaniline component, and wherein at least 50, 60, 70, 80, 85, 90, 95, 98 or 100 weight percent of the inner layer is derived from a non-thermoplastic polyimide component and a doped polyaniline component.